



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

Tae-wan KIM et al.

Art Unit: 1763

Serial No. 10/748, 277

Examiner: Luz Alejandro Mulero

Filed: December 31, 2003

Confirmation No. 6602

For: INDUCTIVELY COUPLED  
ANTENNA AND PLASMA  
PROCESSING APPARATUS USING  
THE SAME

Atty. Docket No. 249/409

Mail Stop Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Va. 22313-1450

DECLARATION UNDER 37 C.F.R. § 1.132

OF:

Yury Nikolaevich Tolmachev

Sir:

1. I, Yury Nikolaevich Tolmachev, a citizen of Russia, having an address of 443-738, Cheongmyeong APT 401-1003, Yeongtong-Dong, Yeongtong-gu, Suwon-si-city, Kyungki-do, Korea, declare and say that:

2. I am co-inventor of the invention which is the subject matter of United States Patent Application Serial No. 10/748,277, filed December 31, 2003, and claiming priority benefit under 35 U.S.C. § 119 to Korean Patent Application No. P2003-380;

3. I am presently employed by Samsung Electronics Co. Ltd., Seoul, Korea;

4. I am a graduate of Moscow State University and received a masters degree in Physics. I graduated in February, 1972;

5. I have been an employee of Samsung Electronics Co. Ltd. since July, 7, 2000 and have been engaged in research and development in the area of plasma processing devices in Samsung Electronics Co.'s SAIT Department. From the year 2000 to the present, a period of six years, I have been researching high density plasma sources;

6. I therefore have over six years of experience in the field of technology relating to plasma processing devices and inductively coupled devices, and particularly to inductively coupled antennas, the subject matter of the above-referenced patent application;

7. Because of my own education and experience, I believe myself to be one of at least ordinary skill in the art of inductively coupled devices, e.g., inductively coupled antenna for a plasma processing device and inductively coupled plasma processing devices. Based upon my six years of experience, it is my opinion that one of ordinary skill in the art of plasma processing devices and inductively coupled antennas would be one with a scientific degree, having at least two years experience in the design and/or fabrication of inductively coupled devices;

8. I conducted experiments that led to the presently claimed invention, in which inductively coupled antennas and inductively coupled plasma processing devices are disclosed and claimed. The intended result is to improve density distribution of plasma in a reaction chamber of an inductively coupled plasma processing device, and to reduce capacitive coupling, power loss and damage to a substrate being processed. By providing an inductively coupled antenna including a coil having a plurality of turns including an outermost turn and a plurality of inner turns, wherein the outermost turn is connected in parallel with the plurality of inner turns, a larger current may flow through the outermost turn than the inner turns. Thus, an electric field induced at an edge portion of the antenna may be closer to and/or substantially equal in strength to an electric field induced at a center portion of the antenna than in conventional inductively coupled plasma processing devices. Claims 1 and 11 specifically recite that a sum of lengths of

the plurality of inner turns is longer than a length of the outermost turn. Thus, in embodiments of claims 1 and 11, a larger current flows through the outermost turn than the inner turns, and thus, an electric field induced at an edge portion of the antenna may be closer and/or substantially equal in strength to an electric field induced at a center portion of the antenna than in conventional inductively coupled plasma processing devices;

9. I have carefully read WO 00/00993 to Chen et al. (hereinafter the "Chen 993 reference");

10. By comparison to embodiments of my invention as recited in claims 1 and 11, the Chen 993 reference discloses an antenna employing tuning capacitors for adjusting a current in an outer coil thereof to be larger than a current in an inner coil. Further, the Chen 993 reference teaches that while the inner coil typically has a shorter electrical length than the outer coil, a greater degree of current adjustment may be realized when the electrical length of the coils are substantially similar. Thus, not only does the Chen 993 reference fail to disclose or suggest "a sum of lengths of the plurality of inner turns being longer than a length of the outermost turn" feature of claims 1 and 11, the Chen 993 reference provides no motivation, and may rather teach away from, providing an antenna having this feature of claims 1 and 11. Accordingly, the Chen 993 reference fails to disclose or suggest "a sum of lengths of the plurality of inner turns being longer than a length of the outermost turn," as recited in claims 1 and 11 of the above-identified application;

11. The solutions taught by the Chen 993 reference would not, under ordinary circumstances, i.e., without undue experimentation and manipulation thereof, obtain results remotely similar to those obtained by application of my invention as claimed;

12. It is my opinion that a person having the qualifications described in paragraph 7, at least as early as December 31, 2003, would not find the present invention as claimed obvious from the disclosure of the Chen 993 reference;

13. It is my opinion that a person having the qualifications described in paragraph 7, at least as early as December 31, 2003, would find that the disclosure in the Description of the Related

Art" in the above-identified application fails to provide the teaching noted above in paragraph 10 as missing from the Chen 993 reference, and thus, would not find the present invention as claimed obvious from the disclosure of the Chen 993 reference in view of the disclosure in the "Description of Related Art" section of the above identified application; and

14. The undersigned inventor declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.



Yury Nikolaevich Tolmachev

Date: 2006. 11. 08